



0065540

Geotechnical Laboratory  
PO Box 4339  
1570 Bear Creek Road  
Oak Ridge TN 37830  
(865) 482-6497

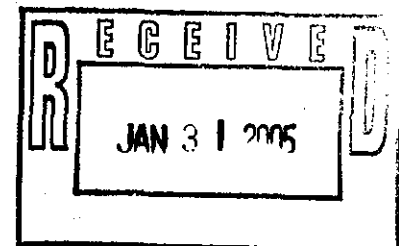
## CERTIFICATE OF ANALYSIS

Stephen Trent  
Fluor Hanford, Inc.  
825 Jadwin Avenue  
Richland, Washington 99352

January 27, 2005

This is the Certificate of Analysis for the following samples:

Shaw Project ID:	Eberline - Hanford
Shaw Project Number:	100846.42000000
Client Sample Data Group:	H2886
Date Received by Lab:	December 15, 2004
Number of Samples:	One (1)
Sample Type:	Soil



### I. Introduction/Case Narrative

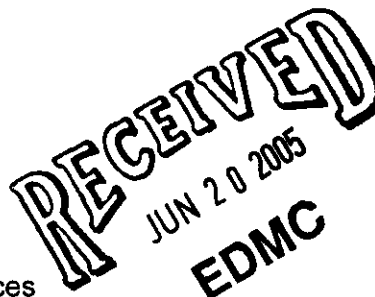
One soil sample was received by the Shaw Geotechnical Laboratory on December 15, 2004. The sample was submitted for determination of bulk density, sieve analysis, hydraulic conductivity, specific gravity, and calcium carbonate content. The sample number received was B1BR56.

Please see Appendix A, Sample Number Cross Reference List; Appendix B, Analysis Results; and Appendix C, Chain-of-Custody/Sample Receipt Records.

"I certify that this data package is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature."

Reviewed and Approved:

Ralph Cole  
Laboratory Manager, Geotechnical Services



00000001

## II. Analytical Results/Methodology

REFERENCES: United States Army Corps of Engineers (USACE), Engineer Manual 1110-2-1906, *Laboratory Soils Testing*, appendix II, 1970; United States Environmental Protection Agency, SW846, *Test Methods for Examining Solid Waste, Physical/Chemical Methods*, 3rd ed., Nov 1986 (EPA SW-846). Annual Book of ASTM Standards, Section 4, Construction, Volume 04.08, *Soil and Rock (I)*, and Volume 04.09, *Soil and Rock (II)*, 2004. Shaw Environmental and infrastructure, Standard Operating Procedures.

Moisture Content of Soil and Rock.....	ASTM D 2216
Bulk Density of Soils.....	EM 1110-2-1906
Particle-size Analysis of Soils.....	ASTM D 422
Hydraulic Conductivity of Porous Materials Using a Flexible Wall Permeameter.....	ASTM D 5084
Specific Gravity of Soil.....	ASTM D 854
Calcium Carbonate Content.....	ASTM D 4373

## III. Quality Control

Quality control checks such as duplicates and spikes (QC samples), are not normally applicable to geotechnical testing. This is due largely to the inability of obtaining samples with known characteristics, the heterogenous nature of the samples, and quality control procedures built-in to the analytical method.

QC measures to ensure accuracy and precision of test results include the following:

- 100% verification of all numerical results - raw data entries, transcriptions and calculations entered by lab technicians are checked, recalculated and verified. Most data calculations are performed by computer programs.
- Data validation through test reasonableness - summaries of all test results for individual reports are reviewed to determine the overall reasonableness of data and to determine the presence of any data that may be considered outliers.
- Quality control procedures are built into most standardized geotechnical procedures. For example, liquid limit and plastic limit analyses call for re-analyses and specify acceptance criteria.
- Routine instrument calibration - instruments, gauges and equipment used in testing are calibrated on a routine basis. All instrument calibration follows ASTM or manufacturer guidelines.

- Maintenance of all past calibration records - calibration records and certification documents of all instruments, gauges and equipment are updated routinely and maintained in the Quality Control Coordinators Quality/Operations files.
- Certified and trained personnel - all technicians are certified by the National Institute for Certification of Engineering Technicians (NICET) in geotechnical soil testing, and are trained in the application of standard laboratory procedures for geotechnical analyses as well as the quality assurance measures implemented by Shaw.
- Quantitative analyses frequently used in geotechnical/physical testing programs do not use QC tools common to wet chemistry or radiochemistry laboratories. Measures not employed in the analysis of samples reported in this report include: laboratory control samples (LCS), blanks, matrix spikes (MS), duplicate analyses, dilutions, digestions, correction factors, surrogate sample analyses, detection limit determinations, control charts, and/or tentatively identified compounds (TICs).

#### IV. Data Qualification

None.

00000003

**Appendix A**  
**Sample Cross-Reference List**

Page 4 of 11  
January 27, 2005  
Stephen Trent  
Fluor Hanford, Inc.  
Shaw Project Name: Eberline Hanford  
Shaw Project No. 100846.42000000  
SDG No. H2886

**Shaw Geotechnical  
Laboratory  
Oak Ridge TN  
(865) 482-6497**

---

**SAMPLE NUMBER CROSS-REFERENCE LIST**

---

**LAB SAMPLE NO.**

**CLIENT SAMPLE NO.**

**MATRIX**

---

BC0494 ..... B1BR56 ..... Soil

00000005

**Appendix B**  
**Sample Test Results**

PROJECT NUMBER: 100846.42000000

[illegible]

Moisture content calculated by ASTM D 2216 based on sample dry weight.

Bulk density is the weight of wet sample divided by the volume of the wet sample (as-received).

Dry density is the weight of the dry sample solids divided by the volume of the original sample.

00000007

## PARTICLE-SIZE DISTRIBUTION ASTM D 422

Project Name Eberline Hanford

Field Sample No. B1BR56

Project No. 100846.42000000

Lab Sample No. BC0494

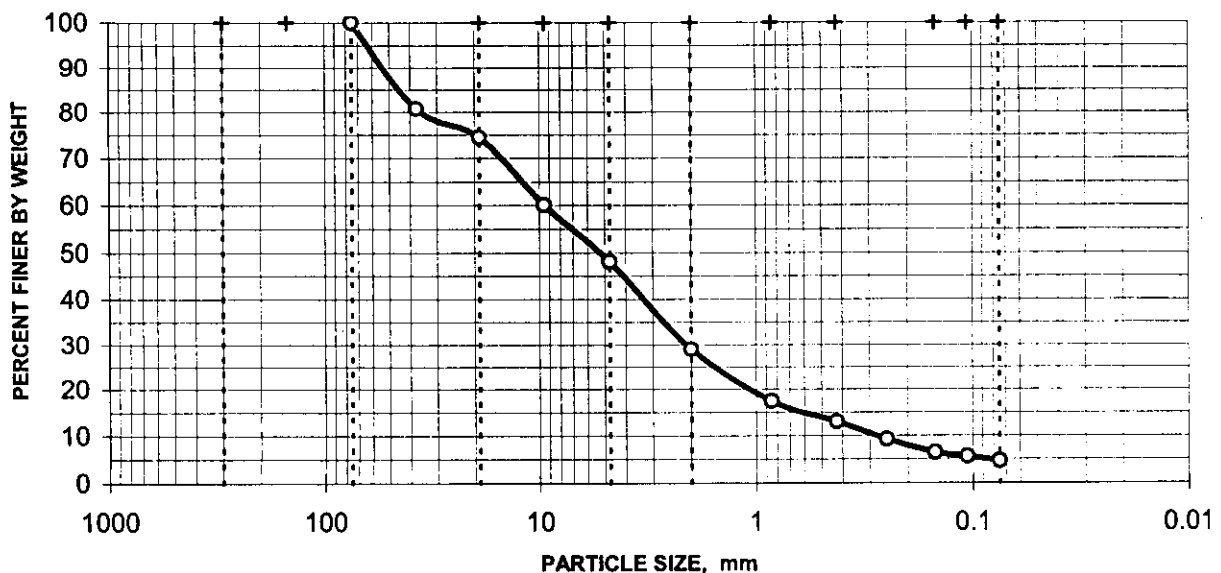
Moisture Content = 6.9%  
 based on dry sample weight

### SIEVE ANALYSIS

C O A R S E	Sieve No.	Diameter mm	Percent Finer
	3"	75.000	100.0%
	1.5"	37.500	80.7%
	0.75"	19.000	74.4%
	0.375"	9.500	60.1%
	#4	4.750	48.1%
	#10	2.000	29.0%

F I N E	Sieve No.	Diameter mm	Percent Finer
	#20	0.850	17.4%
	#40	0.425	13.0%
	#60	0.250	9.2%
	#100	0.149	6.4%
	#140	0.106	5.5%
	#200	0.075	4.6%

### DISTRIBUTION CURVE



51.9% Gravel

43.5% Sand

4.6% Silt/Clay

00000008



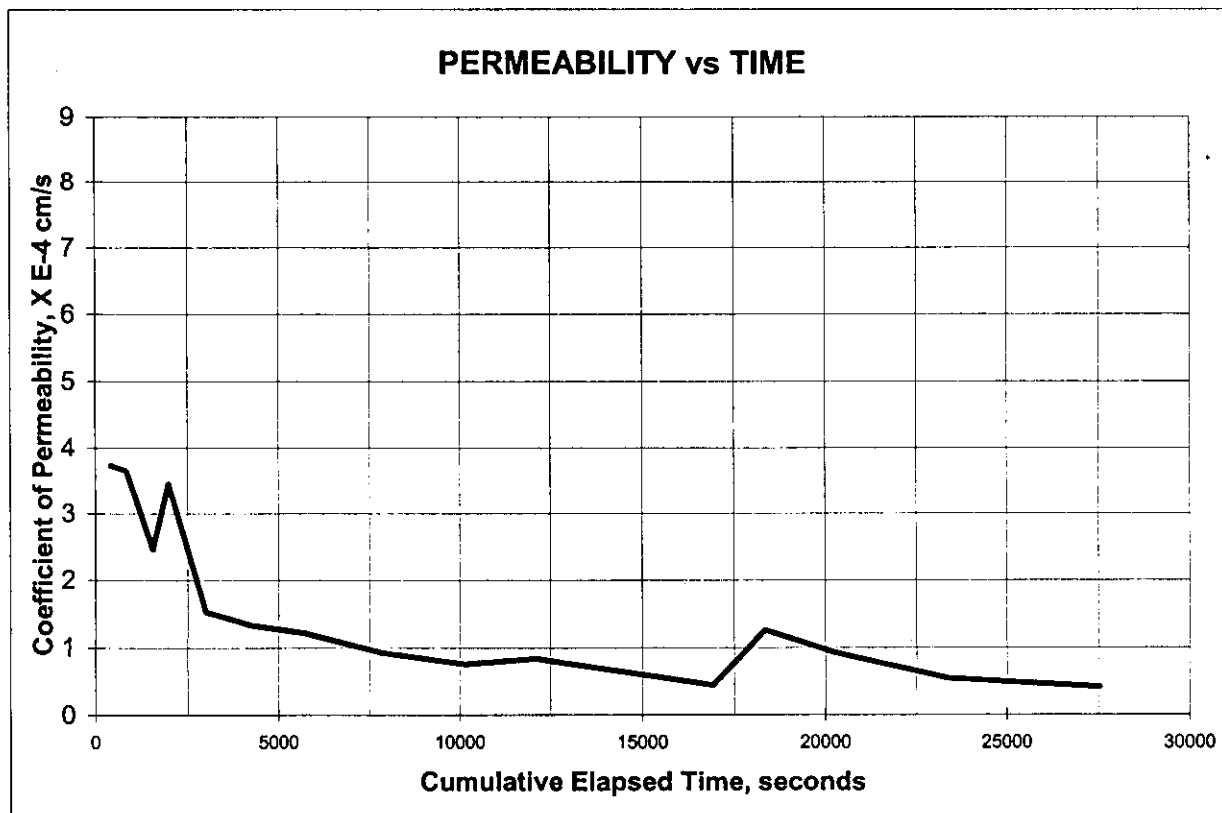
**HYDRAULIC CONDUCTIVITY / PERMEABILITY  
 ASTM D 5084**

PROJECT NAME: Eberline Hanford  
 PROJECT NO. 100846.42000000

CLIENT SAMPLE NO. B1BR56  
 LAB SAMPLE NO. BC0494

	INITIAL	FINAL		
Specimen diameter, cm	5.30		Hydraulic gradient	5.2
Specimen length, cm	6.77		Min. consolidation stress, psi	2.0
Wet weight of specimen, g.	307.43		Max. consolidation stress, psi	2.5
Specimen cross-sect. area, cm <sup>2</sup>	22.04		Total backpressure, psi	7.5
Water content, %	8.9			
Wet unit weight, pcf	128.7		Permeant Fluid	Deaired DI Water
Dry unit weight, pcf	118.2			
Degree of saturation, %	55.4			
Specific gravity of solids	2.72			

**Coefficient of Permeability, cm/s 1.2E-04**



000000009

PROJECT NUMBER:  
**100846.42000000**

[illegible]

0000001 0

PROJECT NUMBER:  
**100846.42000000**

[illegible]

**Appendix C**  
**Chain-of-Custody and Request-for-Analysis Records**

Fluor Hanford Inc.		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST				F04-033-024		PAGE 1 OF 1		
COLLECTOR Alexander/Gent/Thomas		COMPANY CONTACT TRENT, SJ		TELEPHONE NO. 373-5869		PROJECT COORDINATOR TRENT, SJ		PRICE CODE 8N DATA TURNAROUND 45 Days / 45 Days		
SAMPLING LOCATION 200-ZP-1/C4301/240-245 ft 260-262 ft 12/02/04		PROJECT DESIGNATION 200-ZP-1 Characterization Sampling and Analysis - Soil				SAF NO. F04-033		AIR QUALITY <input type="checkbox"/>		
ICE CHEST NO. GRP-03-009		FIELD LOGBOOK NO. HNF-N-314-2		COA 119325E510		METHOD OF SHIPMENT Federal Express				
SHIPPED TO Shaw Group		OFFSITE PROPERTY NO. Su PTK 14537				BILL OF LADING/AIR BILL NO. Su PTK 14537				
MATRIX* A=Air DL=Drum Liquids DS=Drum Solids L=Liquid O=Oil S=Soil SE=Sediment T=Tissue V=Vegetation W=Water WI=Wipe X=Other	POSSIBLE SAMPLE HAZARDS/ REMARKS  Rad to B1BR62  SDG# H2886		PRESERVATION None							
			TYPE OF CONTAINER Split Spoon Liner							
			NO. OF CONTAINER(S) 1 12/02/04							
			VOLUME 1000g							
	SPECIAL HANDLING AND/OR STORAGE		SAMPLE ANALYSIS SEE ITEM (1) IN SPECIAL INSTRUCTIONS							
SAMPLE NO.		MATRIX*		SAMPLE DATE		SAMPLE TIME				
B1BR56		SOIL		12/02/04		830		BC 0494		
CHAIN OF POSSESSION				SIGN/ PRINT NAMES				SPECIAL INSTRUCTIONS		
RELINQUISHED BY/REMOVED FROM Greg Thomas 12/02/04 1517		DATE/TIME		RECEIVED BY/STORED IN Refrigerator #1 MA-026 12/02/04 1517		DATE/TIME		(1) Bulk Density - D2937; Particle Size (Dry Sieve) - D422; Calcium Carbonate Content; Saturated Hydraulic Conductivity; Particle Density - D854;  Priority for Analysis's 1) Saturated Hydraulic Conductivity 2) Bulk Density 3) Calcium Carbonate 4) Particle Density 5) Particle Size		
RELINQUISHED BY/REMOVED FROM MA-026 12/7/04 0910		DATE/TIME		RECEIVED BY/STORED IN MA-026 12/7/04 0910		DATE/TIME				
RELINQUISHED BY/REMOVED FROM MA-026 12/7/04 0910		DATE/TIME		RECEIVED BY/STORED IN Fed Ex		DATE/TIME				
RELINQUISHED BY/REMOVED FROM Fed Ex 12/9/04 9130		DATE/TIME		RECEIVED BY/STORED IN Fed Ex 12/9/04 11:30		DATE/TIME				
RELINQUISHED BY/REMOVED FROM Fed Ex 12/14/04		DATE/TIME		RECEIVED BY/STORED IN Fed Ex 12/14/04		DATE/TIME				
RELINQUISHED BY/REMOVED FROM		DATE/TIME		RECEIVED BY/STORED IN		DATE/TIME				
LABORATORY SECTION		RECEIVED BY Don Healy		TITLE SHAW & I SR. LAB TECH.				DATE/TIME 12/15/04 0900		
FINAL SAMPLE DISPOSITION		DISPOSAL METHOD		DISPOSED BY				DATE/TIME		

00000013

SDG H2886  
Eberline Svcs

PAGE 1

CHAIN OF CUSTODY

ORD # R4-12-101

12/09/04 15:37:32

WORK ID: SAF# F04-033 SDG H2886

RCVD: 12/09/04 DUE: 01/23/05

KEEP: 01/23/06 DISP: S

<u>DASH</u>	<u>SAMPLE IDENTIFICATION</u>	<u>STORED</u>	<u>TESTS</u>
01A-S	B1BR56	SHAW	DISPOS E331S E335S E342S E345S

=====

<u>RELEASED BY</u>	<u>DATE</u>	<u>TRANSFERRED TO</u>	<u>DATE</u>	<u>RECEIVED BY</u>	<u>DATE</u>
<u>Frederick</u>	<u>12/14/04</u>	<u>SHAW LAB.</u>	<u>12/14/04</u>	<u>DHawley SHAW E+I</u>	<u>12/15/04</u>

BC 0494

00000014